Beryllium Occupational Health Issues

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OEL issues (true etiology for standard setting?)

- Maintain exposures below the occupational exposure limit
- However, it appears –
  - Rates of sensitization and chronic beryllium disease (CBD) could be related to work areas where particle sizes are small
  - Total mass measurement of beryllium in air is a poor marker of biological risk of CBD

Occupational Exposure Limits (OEL) issues (true etiology for standard setting?)

- Putting together what is suspected so far:
  - Sensitization and CBD related to particle size and relative to surface area
  - Sensitization and CBD related to chemical form
- Is measuring total beryllium mass concentration obscuring the exposure-response relationship?
- Evaluating the relationship of particle size and CBD
  - Are we currently using an exposure standard with the wrong metric?

OEL issues (true etiology for standard setting?)

- Define a safe air concentration limit? "Not likely" (K. Kreiss, 2007)
  - Need to know physicochemical characteristics of the aerosols
  - Characterized by:
    - Chemistry
    - Size
    - Surface area
    - Solubility in body fluid compartments

Workplace Exposure Assessment Issues

- Current Occupational Exposure Limits (OELs)
  - Occupational Safety and Health Administration (OSHA) (29 CFR 1910.1000 Table Z-2)
    - 2 ug/m3 8-Hour TWA
    - 5 ug/m3 Ceiling
    - 25 ug/m3 Acceptable Maximum Peak (30 Min)
  - National Institute for Occupational Safety and Health (NIOSH)
    - 0.5 ug/m3 any time
  - American Conference of Governmental Industrial Hygienists (ACGIH) Threshold Limit Value (TLV)
    - **New!** 0.05 ug/m3 TWA Inhalable
  - Department of Energy (DoE 10 CFR 850)
    - 2 ug/m3 8-Hour TWA with an Action Level of 0.2 ug/m3

Workplace Exposure Assessment Issues

- What OELs do the services use?
  - OSHA Permissible Exposure Limits (PELs) by law
  - Army, Air Force mainly the TLVs
  - Navy - OSHA but could suggest TLVs if supported by local resources

Impact of using new Threshold Limit Value (TLV)

- TLV mass currently under limit of quantification for current sampling and analytical methods to assess exposures.
- Need an increase of air volume sampled to get the Reporting Limit down to at least one half of the TLV.
- May require an increase in sample time (to gain necessary volume)
  - Reduces the ability to evaluate "transient" (short term) exposures or to determine the actual task that causes exposures.

Impact of using new TLV

- A change in the sampling and analysis methodology (inhalable) will most likely not be equated to previous airborne evaluations and exposure estimates of previously evaluated operations.
- Increase costs (Inhalable Sampler)
  - Management issues of sending the inhalable inserts to the lab with a needed protocol for appropriate cleaning and the ultimate return to the user

What are other agencies doing (DoE, NNSA)?

- National Nuclear Security Administration (NNSA) putting together a guidance document for non-beryllium work areas.
  - Includes surface wipe sampling. This effort may be cancelled.
- Department of Energy (DoE) looking at updating their rule.
  - DoE rule forces the responsibility of identifying Beryllium on the Safety and Health Community. This should be a Weapon System Program Manager responsibility.

Potential OSHA rulemaking issues

- OSHA rulemaking still on the agenda
- OSHA posed the question whether to adopt the DoE rule.
  - No!

Surface Contamination issues

- Recent research (proof of concept) that 1 micron particles can penetrate through the skin. If Beryllium particles present, there is a chance of sensitizing workers.
- Los Alamos incident – Surface contamination of a museum of Beryllium artifacts. They contacted over 2100 known visitors for follow-up

National Academy of Science, Committee on Toxicology Report

- Air Force funded study - Of special concern are the recommendations
  - Cannot define an appropriate OEL. This can be interpreted that if a beryllium exposure can be measured, it is an unacceptable risk. This would significantly increase the number of “workers exposed” regardless of actual risk.

The Genetic Information Nondiscrimination Act of 2008

- Genetic predisposition to become sensitized to Beryllium
- Regulations were to be promulgated by May 09. They are way behind.
- The law also prohibits most employers from using genetic information for hiring, firing, or promotion decisions, and for any decisions regarding terms of employment.

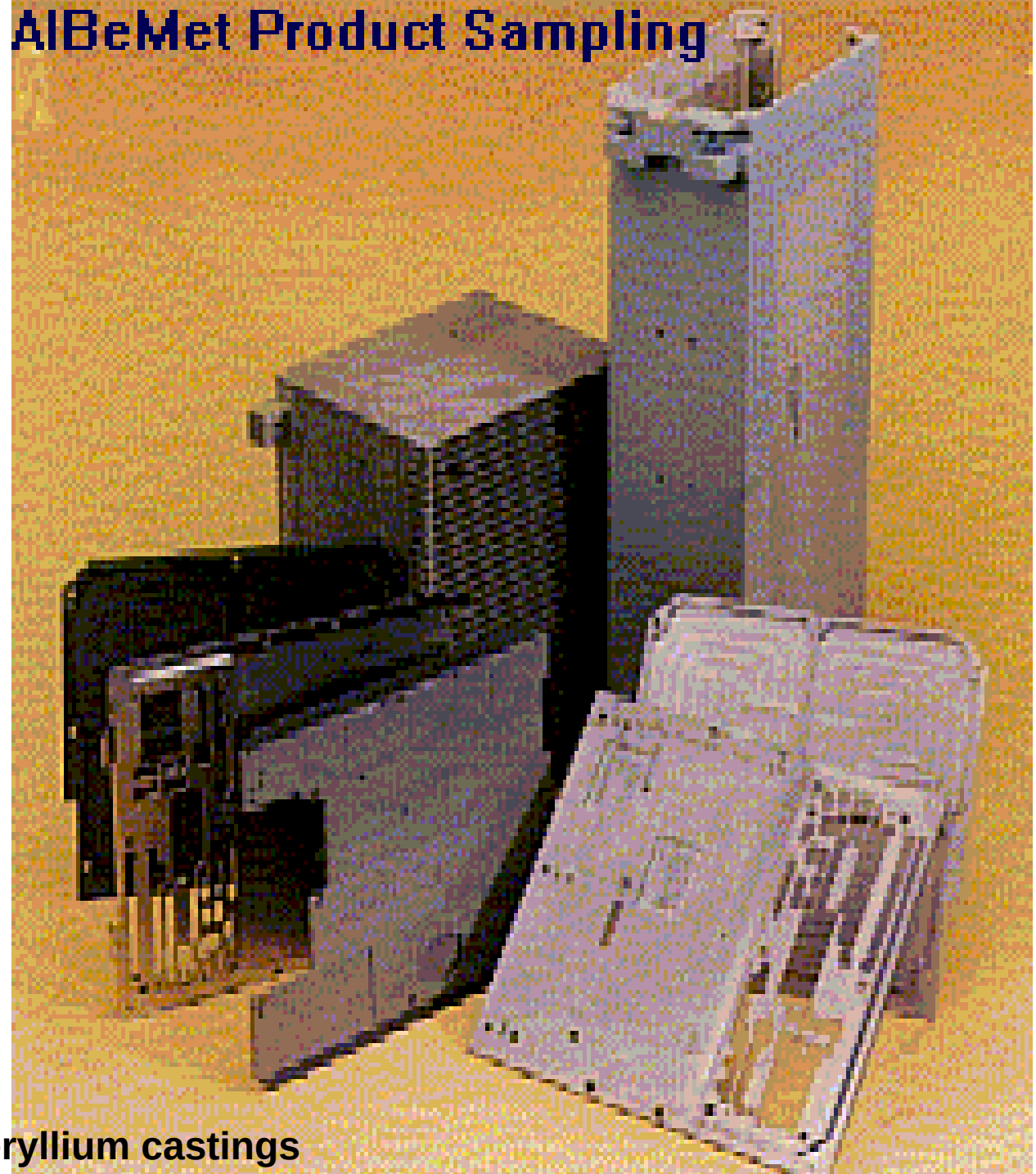
Beryllium Lymphocyte Proliferation Test

- A test to determine if an individual is sensitized to Beryllium.
  - Sensitized at work? Home? Previous job?
- Once declared positive for being sensitized, what will the employer need to do?
  - Note 1 – 2 % positives are being seen of new hire workers who have never worked with it.

- **Uses of beryllium**

Aircraft landing gear bushings - Copper/Beryllium

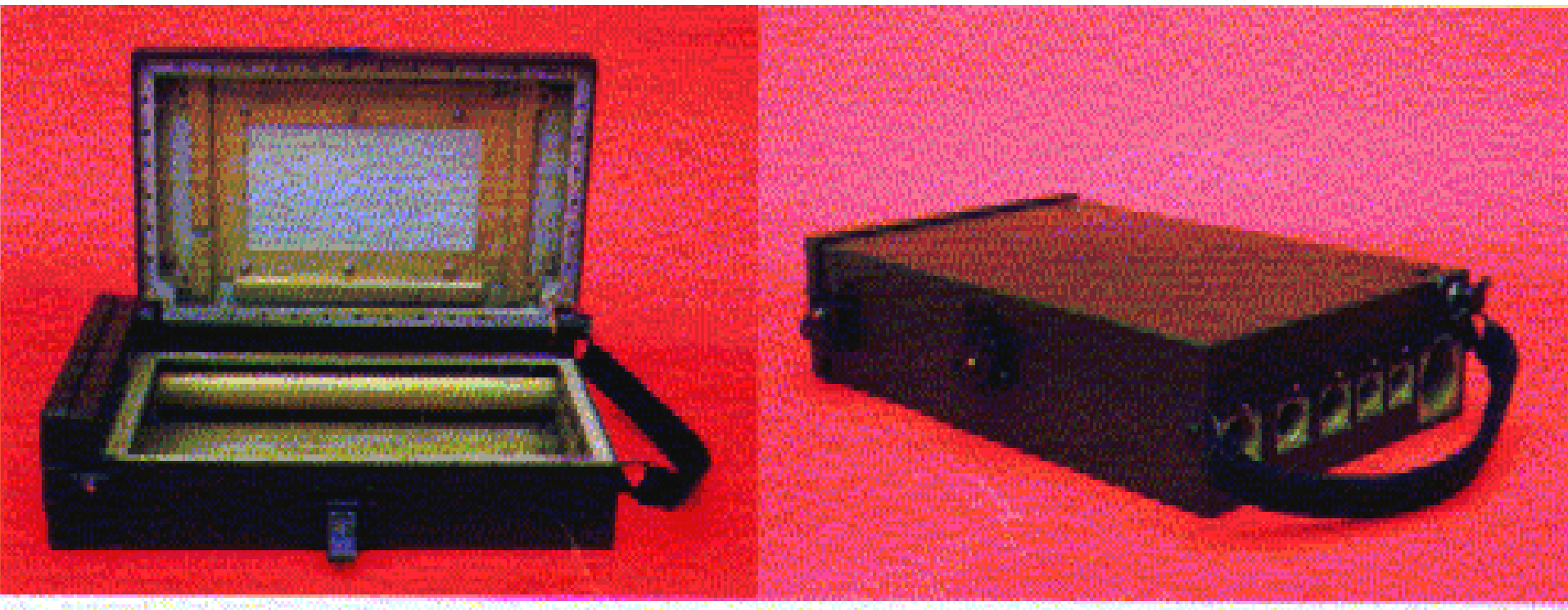
Flight surface actuator bearings – Copper/Beryllium



Aluminum/beryllium castings

Beryllium windows for X-ray/electron beam units

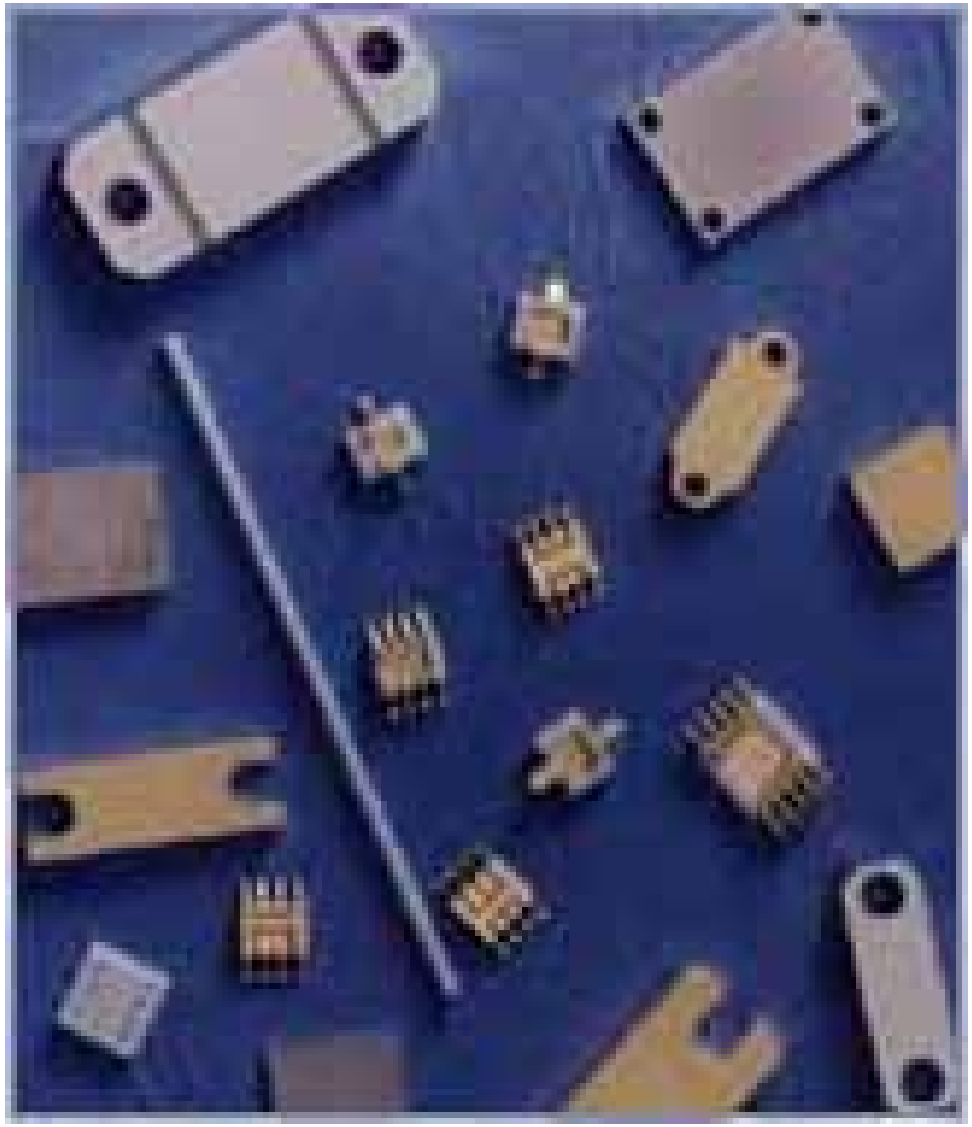
Early Capsule Heat shield



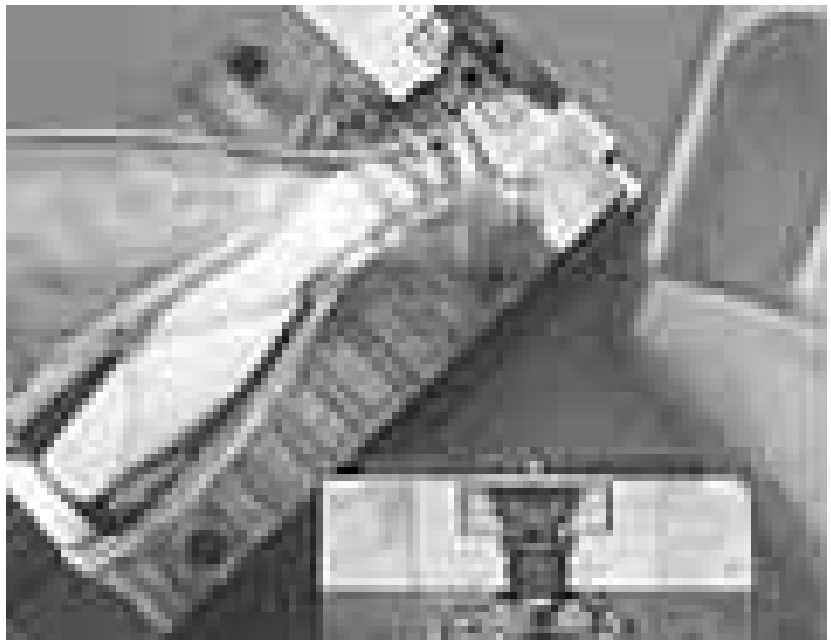
Military Ruggedized Lap Top Computer Case

Copper/beryllium Parts fabricated. Some are in your computer

Beryllium oxide ceramic electronic parts. Beryllium ceramics are good electrical insulators and are very efficient in transferring heat

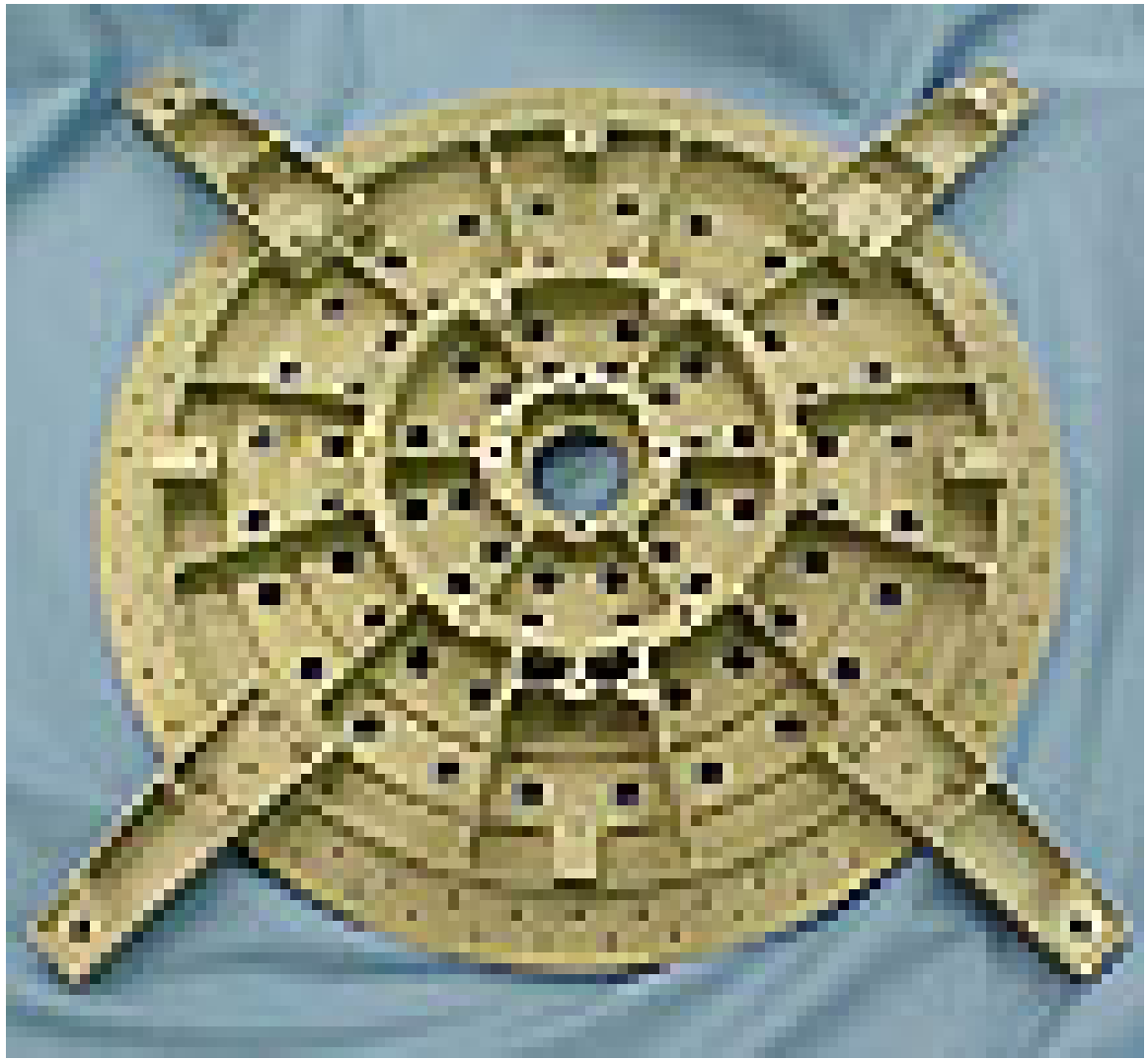



Pro Model



Molds to make plastic bottles

Electrical Spring Contacts



Antenna Strong back – Used for its light weight and dimensional stability

An emerald is a crystalline form of beryllium aluminum silicate

Discussion?